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09/737,905	12/15/2000	James A. Dirksen	207617	2436

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EXAMINER

CHEN, KIN CHAN

ART UNIT PAPER NUMBER

1765

DATE MAILED: 04/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/737,905

Applicant(s)

DIRKSEN ET AL.

Examiner

Kin-Chan Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 February 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1 and 17-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 17-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1 and 17-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cadien et al. (US 5,340,370; hereinafter "Cadien") in view of Ohmi et al. (US 5,895,509; hereinafter "Ohmi").

Cadien (abstract, col. 6-7) teaches that a method of polishing or planarizing a substrate comprising abrading a least of the surface of a substrate comprising a metal (e.g., tungsten), a metal oxide, a metal composite or combinations thereof. A composition may comprise a metal oxide abrasive (e.g. silica) and a liquid carrier wherein the composition has a **pH of about 4 (see abstract)**. The examiner notes that one embodiment discloses that pH of the composition may be 3.4-3.6 (col.2, line 57). However, Cadien's disclosure is not limited to the exemplified values of pH. Furthermore, in the abstract, Cadien discloses that the composition has a **pH of about 4 (see abstract)**. In addition, the disclosure does not show the criticality of the claimed range by showing the claimed range **achieving unexpected results relative to outside the claimed range**.

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When the claimed range and the prior art range are very similar (i.e., a pH of about 4 and 4-6) the range of the prior art establishes *prima facie* obviousness because one of ordinary skill in the art would have expected the similar ranges to have the same properties. See *in re Peterson*, 65 USPQ2d 1379, 1382, citing *titanium Metals Corp. V. Banner*, 227 USPQ 773, 779. Furthermore, the disclosure by the reference of a preferred embodiment does not teach away from the entire disclosure of the patent, all of which must be considered in the analysis of obviousness. See *In re Burckel*, 201 USPQ 67, 70.

Unlike the claimed invention, Cadien does not teach the metal oxide abrasive has a surface characteristic of a total surface hydroxyl group density no greater than about 3 hydroxyl groups per nm<sup>2</sup>. In a abrasive composition for CMP, Ohmi teaches (col. 3, lines 55-57) that by addition of isopropyl alcohol in the abrasive, the abrasive grains becomes reluctant to adhere to the wafer and making cleaning after polishing easy. Furthermore, it is well known that abrasives may be esterified with alcohol (such as between boiling temperature and 350 °C) so as to provide a good dispersion and solve the surface roughness problem and become convenience for handling, see Kohyama et al. (US 4,664,679; col. 3, lines 45-55) as evidence. Hence, it would have been obvious to one with ordinary skilled in the art to modify Cadien by adding isopropyl alcohol in the abrasive as taught by Ohmi so that the abrasive grains becomes reluctant to adhere to the wafer and making cleaning after polishing easy. As such, the same materials are used with the same process steps (see the specification, page 3, line 34) and same purpose (see the specification, page 1, lines 33-35), it appears that the method of combined prior art would be expected to possess the claimed characteristic (such as the metal oxide abrasive has a surface characteristic of a total surface hydroxyl group density no greater than about 3 hydroxyl groups per nm<sup>2</sup>).

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Dependent claims differ from the combined prior art by specifying well-known features (such as various substrates and abrasives) to the art of semiconductor device fabrication. A person having ordinary skill in the art would have found it obvious to modify the combined prior art by adding any of same well-known features to same in order to provide their art recognized advantages and produce an expected result. It is noted that applicant did not traverse the aforementioned conventionality (e.g., well-known features, obviousness), which have been stated in the office action (November 25, 2003).

3. Claims 1 and 17-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cadien et al. (US 5,340,370; hereinafter "Cadien") in view of Kohyama et al. (US 4,664,679; hereinafter "Kohyama").

Cadien (abstract, col. 6-7) teaches that a method of polishing or planarizing a substrate comprising abrading a least of the surface of a substrate comprising a metal (e.g., tungsten), a metal oxide, a metal composite or combinations thereof. A composition may comprise a metal oxide abrasive (e.g., silica) and a liquid carrier wherein the composition has a **pH of about 4 (see abstract)**. The examiner notes that one embodiment discloses that pH of the composition may be 3.4-3.6 (col.2, line 57). However, Cadien's disclosure is not limited to the exemplified values of pH. Furthermore, in the abstract, Cadien discloses that the composition has a **pH of about 4 (see abstract)**. In addition, the disclosure does not show the criticality of the claimed range by showing the claimed range **achieving unexpected results relative to outside the claimed range**.

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When the claimed range and the prior art range are very similar (i.e., a pH of about 4 and 4-6) the range of the prior art establishes *prima facie* obviousness because one of ordinary skill in the art would have expected the similar ranges to have the same properties. See *in re Peterson*, 65 USPQ2d 1379, 1382, citing *titanium Metals Corp. V. Banner*, 227 USPQ 773, 779. Furthermore, the disclosure by the reference of a preferred embodiment does not teach away from the entire disclosure of the patent, all of which must be considered in the analysis of obviousness. See *In re Burckel*, 201 USPQ 67, 70.

Unlike the claimed invention, Cadien does not teach the metal oxide abrasive has a surface characteristic of a total surface hydroxyl group density no greater than about 3 hydroxyl groups per  $\text{nm}^2$ . In a abrasive composition for polishing of semiconductor, Kohyama teaches (col. 1, lines 19-27 and 65-67; col. 2, lines 7-15, 42-44, 63-65; col. 3, lines 45-55) that abrasives may be reacted with various coupling agents or esterified with alcohol (such as between boiling temperature and 350 °C) so as to provide a good dispersion and solve the surface roughness problem and become convenience for handling. Hence, it would have been obvious to one with ordinary skilled in the art to modify Cadien by reacting the abrasives with coupling agents or esterifying abrasives with alcohol as taught by Kohyama in order to provide a good dispersion and solve the surface roughness problem and become convenience for handling (so-called low adherence of abrasives to the substrate in the specification, page 3, line 9). As such, the same materials are used with the same process steps (see the specification, page 3, line 34 through page 4, line 3), it appears that the method of combined prior art would be expected to possess the claimed characteristic (such as the metal oxide abrasive has a surface characteristic of a total surface hydroxyl group density no greater than about 3 hydroxyl groups per  $\text{nm}^2$ ).

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Dependent claims differ from the combined prior art by specifying well-known features (such as various substrates and abrasives) to the art of semiconductor device fabrication. A person having ordinary skill in the art would have found it obvious to modify the combined prior art by adding any of same well-known features to same in order to provide their art recognized advantages and produce an expected result. It is noted that applicant did not traverse the aforementioned conventionality (e.g., well-known features, obviousness), which have been stated in the office action (November 25, 2003).

### ***Response to Arguments***

4. Applicant's arguments filed February 23, 2004 have been fully considered but they are not persuasive.

Applicant has argued that nothing in Cadien teaches or suggests a pH of 4-6. In fact, in the abstract, Cadien discloses that the composition has a **pH of about 4 (see abstract)**. The examiner notes that one embodiment discloses that pH of the composition may be 3.4-3.6 (col.2, line 57). However, Cadien's disclosure is not limited to the exemplified values of pH. In addition, the disclosure does not show the criticality of the claimed range by showing the claimed range **achieving unexpected results relative to outside the claimed range**.

When the claimed range and the prior art range are very similar (i.e., a pH of about 4 and 4-6) the range of the prior art establishes *prima facie* obviousness because one of ordinary skill in the art would have expected the similar ranges to have the same properties. *See in re Peterson*, 65 USPQ2d 1379, 1382, citing *titanium Metals Corp. V. Banner*, 227 USPQ 773, 779. Furthermore, the disclosure by the reference of a preferred embodiment does not teach away from the entire

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disclosure of the patent, all of which must be considered in the analysis of obviousness. *See In re Burckel*, 201 USPQ 67, 70.

Applicant has argued that Kohyama is silent as to pH. As has been stated in the office action, Cadien teaches the value of pH. Therefore, the combined prior art teaches the value of pH.

One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. *In re Merk & Co., Inc.*, 800F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). (our ref. Only ..MPEP 2145 IV.)

### **Conclusion**

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.



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6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kin-Chan Chen whose telephone number is (571) 272-1461. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*April 2, 2004*

  
Kin-Chan Chen  
Primary Examiner  
Art Unit 1765

K-C C